



(Knowledge for Development)

KIBABII UNIVERSITY
UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
SECOND YEAR SECOND SEMESTER
SPECIAL/ SUPPLEMENTARY EXAMINATION
FOR THE DEGREE OF BACHELOR OF EDUCATION AND
BACHELOR OF SCIENCE
MATHEMATICS

COURSE CODE: MAT 224

COURSE TITLE: ANALYTIC GEOMETRY

DATE: 11/10/18

TIME: 11.30 AM -1.30 PM

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

This Paper Consists of 3 Printed Pages. Please Turn Over.

QUESTION ONE COMPULSORY (30 MARKS)

- (a) Define the terms (6 mks)
- (i) Parabola
 - (ii) Hyperbola
 - (iii) Ellipse
- (b) Find the line L through the point $P(3, -2, 3)$ and parallel to the vector $V = \langle 4, -3, 5 \rangle$ giving your answer in form of
- (i) Vector form (2 mks)
 - (ii) Parametric form (2 mks)
 - (iii) Symmetric form (2 mks)
- (c) Find the length of an arc of the semi-cubical parabola $y^2 = x^3$ between the points $(0, 0)$ and $(3, 5)$ (6 mks)
- (d) Given the point $(1, -1, -\sqrt{2})$ in Cartesian coordinates convert into
- (i) Cylindrical coordinates (3 mks)
 - (ii) Spherical coordinates (3 mks)
- (e) Determine the direction cosines and direction angles for $\mathbf{a} = \langle -4, 2, 3 \rangle$ (6 mks)

QUESTION TWO (20 MARKS)

- (a) Identify the surface for $\rho = 4$ (2 mks)
- (b) Given the Cartesian coordinates $(\frac{1}{3}, \frac{\sqrt{2}}{3}, 5)$ convert it into cylindrical coordinates (5 mks)
- (c) Find the line of intersection L of the planes $7x - 5y + z - 12 = 0$ and $4x + 2y - 5z + 0 = 0$ (7 mks)
- (d) Analyze the equation $4 + y^2 - 4x - 8y + 5 = 0$ (6 mks)

QUESTION THREE (20 MARKS)

- (a) Find the foci and asymptotes of the hyperbola $9x^2 - 16y^2 = 144$ and sketch the graph (6 mks)
- (b) Sketch the conic $9x^2 - 4y^2 - 72x + 8y + 104 = 0$ (6 mks)
- (c) A parabola having the origin as its vertex, the y-axis as its axis of symmetry and $(-10, -5)$ on its graph. Find
- (i) The equation of the parabola (6 mks)
 - (ii) The coordinates of its focus and the equation of the directrix (2 mks)

QUESTION FOUR (20 MARKS)

- (a) Find the distance of the point $(-2,3,5)$ from the plane $4x - 2y + z - 9 = 0$ (3 mks)
- (b) Determine the angle between the lines whose direction ratios are $(\sqrt{2}, \sqrt{3}, -4)$ and $(1, -1, 4)$ (4 mks)
- (c) Sketch the ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1$ (7 mks)
- (d) Find the coordinates of the point through $(-4,1, -5)$ and $(4,3,1)$ crosses the zx -plane (6 mks)

QUESTION FIVE (20 MARKS)

- (a) Find the focus and the directrix of the parabola $x^2 = 10y$ and sketch the graph (6 mks)
- (b) Convert the equation of the parabola $y^2 + 8y + 12x + 13 = 0$ to standard form and hence sketch the graph (6 mks)
- (c) Find the coordinates of the point where the line through $(-3,2,-4)$ and $(1,-2,-1)$ crosses the plane $2x + 3y + z = 7$ (8 mks)

END